September 22, 1948.

Dr. Martin Kristensen,
Statens Seruminstitut,
Kobenhavn, Danmark.

Dear Dr. Kristensen,

Thank you for your letter of the 1st September, and the culture of S. typhi II which arraived in good condition. I am glad that you clarified the status of typhi II for me. If you should ever encounter any examples of "shift mutations" in the sense I used the term, I would be very grateful to hear from you about it.

As to the simultaneous acquisition of two or more fermentative capacities: My work on E. coli K-12, so far unpublished has led me to the conclusion that the genetic control of fermentative enzymes is highly complex, i.e., that there is no simple 1:1 relationship here bewteen gene and enzyme. We have for example a coli mutant which is negative for lactose, maltese and gluconate, and as far as could be tested with many organisms, suffers a mutation of a single gene. As you might expect, such mutants occasionally "revert", and when they so do, could be spoken of as acquiring (rather re-acquiring) several fermentative capacities, in analogy to your cases. As I am studying lactose fermentation most intensively, I should be interested to hear if you ever encounter such complex "reversions" in which lactose is implicated.

Yours sincerely,

Joshua Lederberg
Assistant Professor of Genetics.